

PERMANENT LOW COST RADIO FREQUENCY COMPRESSOR IDENTIFICATION

BACKGROUND OF THE INVENTION

[0001] This invention relates to an apparatus for remotely storing and retrieving data from a compressor.

[0002] Refrigeration systems frequently use a compressor to compress refrigerant as part of a refrigeration cycle. Modern compressors are typically enclosed in a sealed housing, which also houses a motor that drives the pump unit. The motor may be driven by a single phase or three phase power supply.

[0003] Compressors operate under many extreme conditions. Consequently, some compressors have relatively complex operational parts. In one popular modern type compressor, the pump unit includes two spiral scroll wraps which orbit relative to each other to compress entrapped refrigerant. These scroll-type compressors are gaining in popularity.

[0004] Compressors, such as scroll compressors, are generally mass produced. While each compressor may conform to the same specifications, they may vary within tolerances of the specifications. Consequently, compressors may vary from production run to production run. Moreover, each compressor may be shipped to different locations and be used in different operating environments, thereby causing each compressor to be subject to differing amounts and types of wear. Also, each compressor will have its own unique service history at each location.

[0005] Manufacturers find it useful to keep track of the history of a particular compressor. Such information, for example, may assist the manufacturer in identifying root cause problems from field failures. In the past, manufacturers have used bar code labels to distinguish one compressor from another. However, these

labels serve only to identify a specific compressor. A person keeping track of the history of the compressor must then access a separate and remote database to retrieve information specific to the compressor. This additional step may be time consuming. It would be useful to write information at the compressor's location regarding the manufacturing and service history of a particular compressor.

[0006] The assignee of this application has developed a compressor diagnostic system on the compressor itself that tracks data relating to the compressor and stores this information in memory at the compressor. This system is described by U.S. Patent No. 6,406,265 B1 to *Hahn, et al.*, which issued on June 18, 2002.

[0007] In the foregoing system, data is obtained from sensors within the compressor and stored at a microprocessor. This data may be subsequently retrieved through an output jack, which allows information to be downloaded through the jack to another computer for subsequent analysis. Such a system for storing and retrieving information may be inconvenient when dealing with large numbers of compressors as each jack of each compressor must be accessed to obtain this information.

[0008] A need, therefore exists for a convenient way to read and write information regarding a particular compressor on-site.

SUMMARY OF THE INVENTION

[0009] The invention comprises a compressor having a housing. In contrast to existing compressors, the housing has a receiver for receiving a transmitted signal, which is subsequently stored in a memory unit on the housing. A microprocessor controls the receiver and the memory unit. The microprocessor may be mounted to the housing. In this way, information may be remotely transmitted to

the receiver of a particular compressor. This information is then stored with the compressor on the memory unit.

[0010] In addition, the inventive compressor assembly may have a transmitter, which is also controlled by the microprocessor. The transmitter serves to communicate information stored on the memory unit to allow remote access of this information. This feature permits information to be stored at the compressor while still being written and read from a distance from the compressor.

[0011] Information stored at the compressor may include manufacturing information, such as the manufacturing date and the manufacturing location of the compressor. In addition, the memory unit of the compressor may store information relating to the service history of the compressor, such as dates when the compressor was serviced and the reasons for the service. Environmental information, such as weather conditions in which the compressor has operated, as well as its operational use may be stored on the compressor memory unit too.

[0012] The information may be communicated to the receiver and transmitted by the transmitter by an electric signal, such as a radio frequency signal. Accordingly, a device having another receiver and another transmitter may communicate with the memory unit on the compressor. In this way, information may be downloaded and retrieved from the memory unit of the compressor by a remote unit, such as a handheld device. This feature permits the quick reading and writing of information to the memory unit of the compressor.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The various features and advantages of this invention will become apparent to those skilled in the art from the following detailed description of the currently preferred embodiment. The drawings that accompany the detailed description can be briefly described as follows:

[0014] Figure 1 illustrates the inventive sealed compressor assembly, including memory tag and sealed compressor.

[0015] Figure 2 illustrates the memory tag of Figure 1.

[0016] Figure 3 illustrates a portable remote unit for communicating with the memory tag of Figures 1 and 2.

[0017] Figure 4 illustrates a flow chart of the writing and reading of information from the memory tag of Figures 1 and 2.

[0018] Figure 5 illustrates the types of information regarding a compressor, which may be stored on the memory tag as Figures 1 and 2.

[0019] Figure 6 illustrates a method of writing information to the inventive scroll compressors of Figure 1 in a production line.

[0020] Figure 7 illustrates a method of writing information to the inventive scroll compressors on a pallet.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0021] Figure 1 illustrates a cross-sectional view of inventive sealed compressor assembly 10. Like existing sealed compressor assemblies, inventive sealed compressor assembly 10 has housing 14, which houses compressor pump unit 30 and compressor motor 34. Here, compressor pump unit 30 is shown as a scroll

type compressor as known in the art. Compressor pump unit 30 is driven by compressor motor 34. In contrast to existing assemblies, inventive sealed compressor assembly 10 has memory tag 16. Memory tag 16 may communicate with portable remote unit 62 to both read and write information relating to the compressor as explained in detail below.

[0022] As shown in Figure 2, memory tag 16 has first receiver 18, memory unit 22, compressor microprocessor 38 and first transmitter 42. Microprocessor 38 serves to control the reception of information through first receiver 18 as well as its transmission through first transmitter 42. Compressor microprocessor 38 may store information on memory unit 22 having a non-volatile memory for subsequent retrieval. In addition, compressor microprocessor 38 may retrieve information from memory unit 22 for transmission through first transmitter 42.

[0023] Figure 3 illustrates portable remote unit 62. Like memory tag 16, portable remote unit 62 has second receiver 66, second transmitter 70, remote unit microprocessor 74, and remote unit memory 78. In addition, as shown in Figure 1, portable remote unit 62 also has a display for displaying transmitted and received information as well as an input device 86, such as a keypad or keyboard, to allow for the inputting of information to be transmitted.

[0024] As shown in Figure 1 and 4, information may be transmitted to memory tag 16 by portable remote unit 62 through first signal S_1 , which may be a radio frequency signal. Memory tag 16 receives the transmitted information through first receiver 18. This information is processed by compressor microprocessor 38 and stored on memory unit 22. Subsequently, this information may be retrieved by portable remote unit 62, which signals memory tag 16 to awaken and retrieve stored

information from memory unit 22 for transmission through first transmitter 42. First transmitter 42 transmits second signal S_2 to portable remote unit 62, which has second receiver 66 to receive information as well as remote unit microprocessor 74 to process information for storage on remote unit memory 78. The transmission of information from portable remote unit 62 is through second transmitter 70. In this way, information may be written and read remotely from memory tag 16.

[0025] Figure 5 illustrates the types of information that may be stored on memory tag 16. Such information may include, but is not limited to, manufacturing information 46, service information 50, environmental information 54, and operational or use information 58. Manufacturing information 46 may include an identification number for the particular scroll compressor unit, the manufacturing date, the manufacturing run as well as another other information relating to the manufacture of the compressor. In addition, service information 50 may be stored on memory unit 22. Such information may include the type of service received by the particular compressor unit, the service date, and other service history of the compressor. Environmental information 54 may include information relating to the location of use of the compressor, weather conditions, and other atmospheric information. Also, memory unit 22 may store operation and use information 58 relating to the use of the compressor including its hours of operation and use. By storing this information on the memory tag 16, information relating to the particular compressor assembly may be quickly and easily retrieved at the location of the compressor. Moreover, a history of the compressor unit may be stored on memory unit 22. This invention accordingly allows a wide variety of information to be read and written on the compressor.

[0026] Figure 6 and 7 illustrate how such information may be stored on memory tag 16 in production. Figure 6 illustrates, for example, how an identification number may be stored on sealed compressor assembly 10. As shown in Figure 6, sealed compressor assemblies 10 are arranged in a line to move in the direction of arrow A to second transmitter 70. Second transmitter 70 transmits first signal S_1 to first sealed compressor assembly 90. As shown in Figure 6, second transmitter 70 is arranged to direct first signal S_1 to first sealed compressor assembly 90 only. Second sealed compressor assembly 94 is spaced from first sealed compressor assembly 90 so that it will not receive first signal S_1 when transmitted to first sealed compressor assembly 90. In this way, first sealed compressor 90 may receive a different identification number from second sealed compressor assembly 94.

[0027] Figure 7 illustrates a technique for downloading the same information to a group of sealed compressor assembly units. As shown, second transmitter 70 is arranged to send first signal S_1 to a group of sealed compressor assemblies 10. Here, first signal S_1 is strong enough and sealed compressor assemblies 10 are close enough to receive first signal S_1 simultaneously. In this way, a large number of units may receive the same information for storage on memory tag 16. In addition, a subgroup of sealed compressor assemblies 10 may be removed from pallet 98 so that the remaining sealed compressor assemblies 10 may receive different information from the subgroup removed from pallet 98.

[0028] The aforementioned description is exemplary rather than limiting. Many modifications and variations of the present invention are possible in light of the above teachings. The preferred embodiments of this invention have been disclosed. However, one of ordinary skill in the art would recognize that certain modifications would come within the scope of this invention. Hence, within the scope of the

appended claims, the invention may be practiced otherwise than as specifically described. For this reason the following claims should be studied to determine the true scope and content of this invention.